



AR26

SULZER 78

◁ Spacer rings of the piston cooling jackets
in Sulzer diesel engines

SULZER

Annual Report 1978 Condensation

Sulzer Brothers Limited
Winterthur
Switzerland

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From the Chairman's Address to the Shareholders

During 1978 there was again no tangible improvement in the world economic situation. In the monetary sector some hectic fluctuations of exchange rates occurred in the second half of the year, with the US dollar coming under pressure and the Swiss franc again rising sharply against other currencies. Under the influence of the adverse economic conditions, demand for capital goods remained weak, and therefore total sales of our Group's products once more declined. There was a considerable decrease in orders from the industrialized countries of Europe and North America.

Consolidated incoming orders for the Group amounted to 3027 million Swiss francs (previous year 3396 million Swiss francs). The decline was partly due to a reduction in the volume of incoming orders and partly to lower exchange rates for the conversion of foreign currencies into the Swiss franc.

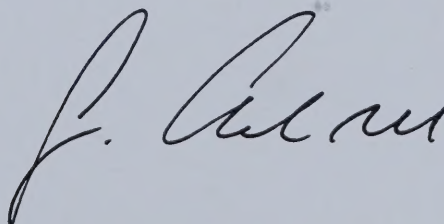
Invoiced Group sales of 3481 million Swiss francs were almost as high as in 1977 (3503 million Swiss francs). Although total work in hand was further reduced, the utilization of production capacity in most works was still relatively satisfactory, taking into account the difficult conditions prevailing.

During the year under report, the number of personnel employed by the Group changed very little. There were 33621 people on the payroll at the end of 1978, as compared with 33860 the previous year.

As a result of the persistent recession and the weak tendency for new investments connected therewith, our Group had to face intensified competition and pressure on prices. Efforts to defend and consolidate our market positions and to gain foothold in new markets were continued intensively in all sectors of our activities. To bring in new business, we were increasingly compelled to accept orders on unfavourable terms and involving greater risks. Special endeavours were also aimed at controlling and reducing costs.

For the immediate future, business prospects remain uncertain. There are no signs of an early and permanent improvement in world economy. It therefore appears unlikely that there will be a significant revival of investment in capital goods during the current year.

Our principal aim remains to maintain and enhance the competitiveness of the Group as a whole at international level. We can rely not only on the high quality of our products but also on our ability to provide customers with the best possible engineering concepts and service.

A handwritten signature in dark ink, appearing to read 'G. Sulzer', is positioned above the printed name of the Chairman.

George Sulzer, Chairman of the Board



View of the original industrial district of Winterthur including Sulzer and SLM workshop and office buildings.

Board of Directors

George Sulzer
Dr. Herbert Wolfer

Chairman of the Board
Vice-chairman

Dr. Oswald Aepli
Dr. Dr. h. c. René Bühler
Dr. Alfred Hartmann
Dr. Samuel Koechlin
Alfred Schaffner
Peter Schmidheiny
Dr. Dr. h. c. Edwin Stopper
Hans Strasser
Dr. Alfred E. Sulzer
Dr. Henry Sulzer
Dr. Peter Sulzer
Philippe de Weck

Chairman Swiss Credit Bank
Chairman Bühler Brothers Ltd.
Vice-chairman F. Hoffmann-La Roche & Co. Ltd.
Chairman of the Executive Committee CIBA-GEIGY Ltd.

Chairman Escher Wyss Ltd.
Chairman Bank Leu Ltd.
Chairman Swiss Bank Corporation
Chairman Handelsbank N. W. Zurich

Scientific consultant
Chairman Union Bank of Switzerland

Auditors

Schweizerische Revisionsgesellschaft, Zurich

Corporate Executive Management

Rudolf Schmid
Marcel Züblin
Artur Frauenfelder
Pierre Borgeaud
Dr. h.c. Max Steiner (*Textile Machinery*)

Corporate Staff

<i>Planning</i>	Kaspar Vogel
<i>Research</i>	Dr. Jost Hännly
<i>Purchasing</i>	Fred Oederlin
<i>Sales Organization</i>	Dr. Hans Plüss
<i>Secretary General, Publicity</i>	Dr. Max Trechsel
<i>Personnel</i>	Dr. Jean Bacher
<i>General Counsel</i>	Dr. Hans-W. Greminger
<i>Finance and Accounting</i>	Erich Müller Anton Grüniger Hans Turttschi
<i>Organization, Data Processing</i>	Pascal Marchal

Divisions / Group Departments

Winterthur Engineering Works

Textile Machinery

Heating and Air Conditioning

Pumps

Thermal Turbomachinery

Foundries

*Industrial Electronics,
Water and Waste-Water Treatment*

Plant Engineering and Contracting

Escher Wyss Zurich

Escher Wyss Ravensburg

*Swiss Locomotive and Machine Works
Winterthur*

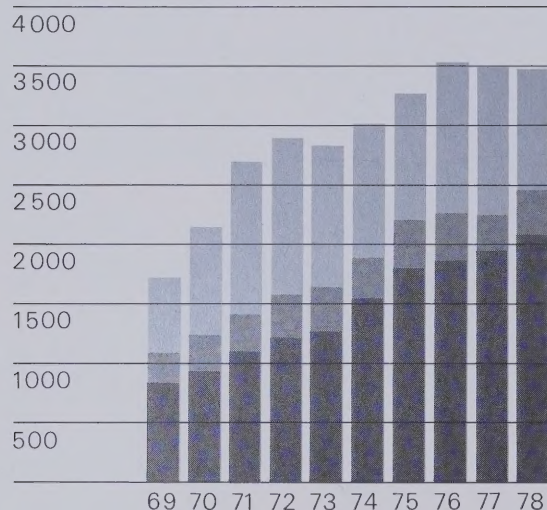
Management

thmar Hegi eter Sulzer ottlieb Wolf n Arie Smit rg Bienz udolf Bleuler . Georg Gerber erner Gehrig	<i>Head of Division Diesel Engines Sales Diesel Engines Technology Diesel Installations Thermal Power Plants and Nuclear Engineering Refrigerating Plants, Compressors and Process Engineering Production Corporate Buildings and Technical Services</i>
. h.c. Max Steiner alter Schneider udolf Leutert alter Fässler	<i>Head of Division Weaving Machinery Weaving Machinery Sales Weaving Machinery Controller</i>
an-Pierre Sandoz dolf Knapp	<i>Head of Division Department Switzerland</i>
nton Reinhart	<i>Head of Division</i>
erhard Kurz	<i>Head of Department</i>
. Res K��pfer	<i>Head of Division</i>
fred L��thi	<i>Head of Department</i>
. Rodolphe Ecabert	<i>Head of Department</i>
. Victor Frey . Ernst M��hlemann . August Guyer hil Lutz kob Wydler	<i>Head of Division Hydraulic Machinery Process Engineering Production Division Controller</i>
ter Dill ans-J��rgen G��nther ax Henzi	<i>Head of Division Paper Machinery Controllable-Pitch Propellers and Production</i>
aus von Meyenburg . Mario Kn��sli	<i>Head of Division Division Controller</i>

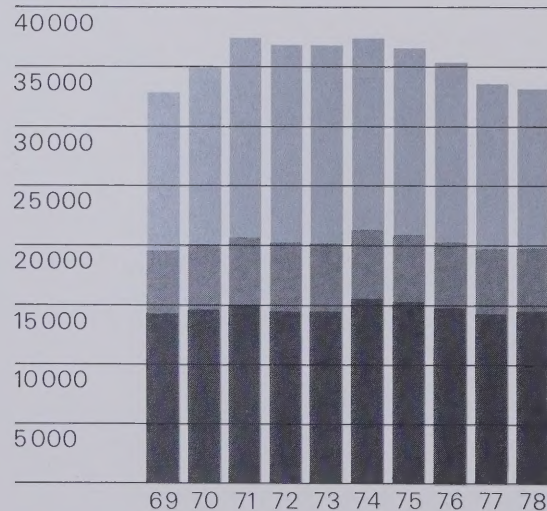
Products

Marine diesel engines Stationary diesel engines Thermal power plants High-pressure steam generating plants Medium- and low-pressure boiler installations Combined cycle power plants Components and systems for nuclear power plants Valves and control systems, spherical pressure vessels Irradiation plants Refrigerating plants, cryogenics Heat pumps, cooling towers Distillation, absorption, mixing processes Rotary and piston compressors Rotary blowers, vacuum pumps
Weaving machines Circular knitting machines Planning of textile mills assigned: Medical engineering
Engineering and contracting for heating, air conditioning, plumbing and fire protection
Pumps for energy generating plants, water-transport and industry
Turbocompressors—centrifugal and axial types Gas turbines Vacuum blowers, expanders
Castings of every kind, size and alloy, in one-off or batch production, in cast iron, SG iron, steel and non-ferrous metals, also precision castings
Industrial electronics Water and waste-water treatment plants
General plant engineering and contracting
Water turbines, storage pumps, pump-turbines Thrust bearings, penstocks and manifolds, closing devices Controllable-pitch marine propellers Power-recovery plants Evaporation and crystallization plants Industrial centrifuges, decanters, drying and cooling units Nipco® deflection-compensation rolls Plants for metal surface treatment Machinery for the asbestos-cement industry Complete plants for the pulp and paper industry Stock-preparation equipment, paper and board machines Intermittent board machines Paper converting equipment
Electric and diesel traction vehicles for adhesion and rack railways Industrial gears, gears for special purpose vehicles, light-metal castings

Total value of business invoiced
in million Swiss francs

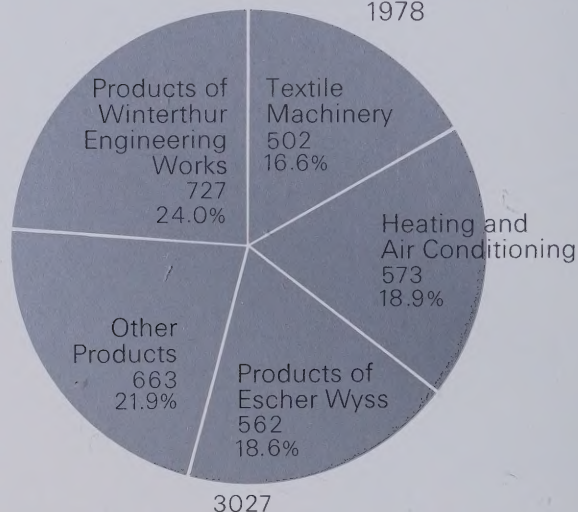


Personnel employed
during the past ten years

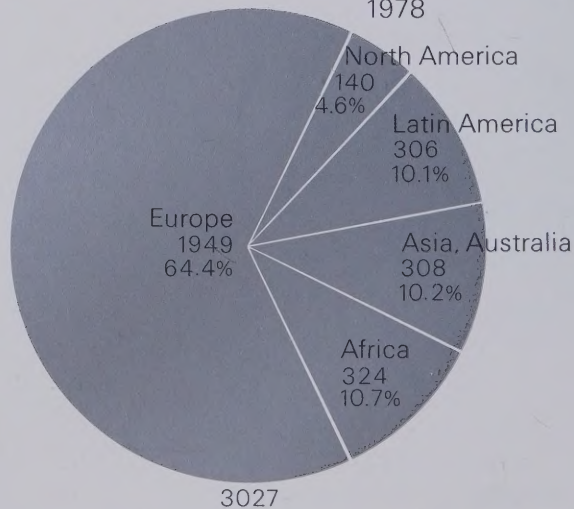


■ Sulzer Brothers Limited, Winterthur
 ■ Swiss Companies of the Group
 ■ Sulzer Group of Companies

The orders received may be classified as follows:
(in million Swiss francs)
1978



The incoming orders originate from the following
market areas:
(in million Swiss francs)
1978



Highlights of the Financial Results

Figures in Swiss francs

1 US\$ = Sfr. 1.65

1 £ Sterling = Sfr. 3.30

1978

1977

Sulzer Brothers Limited, Winterthur

	1978	1977
Orders received	1 404 011 000	1 636 798 000
Sales invoiced	2 072 319 000	1 945 402 000
Net profit after taxes	34 347 000	41 458 000
Dividend	29 400 000	29 400 000
Capital and reserves	608 000 000	603 000 000

Sulzer Group of companies

Orders received	3 027 106 000	3 395 586 000
Sales invoiced	3 481 200 000	3 502 625 000

Personnel employed at year end

<i>Sulzer Brothers Limited, Winterthur</i>	14 473	14 349
<i>Sulzer Group of companies</i>	33 621	33 860

Group Accounts

Group Profit and Loss Account

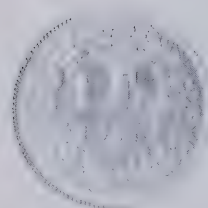
Figures in million Swiss francs

1 US\$ = Sfr. 1.65

1 £ Sterling = Sfr. 3.30

1978

1977



Earnings

Invoiced sales	3481	3503
Change in stocks and work in progress	-260	-70
Sundry income	110	111
Total earnings	3331	3544

Costs

Payments to personnel	1095	1107
Social expenditure	182	180
Direct material costs and sundry expenditure	1853	2006

<i>Cash flow</i>	201	251
Depreciation on fixed assets	156	167

<i>Group profit</i>	45	84
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Survey of the Investments in the Sulzer Group

Figures in million Swiss francs
on 31st December

1978

1977

1 US\$ = Sfr. 1.65

1 £ Sterling = Sfr. 3.30

Investments

Inventories and work in progress	2241	2518
Accounts receivable	1150	1097
Cash and securities	832	878
Total current assets	4223	4493
Land and buildings	775	783
Machinery and equipment	699	678
Financial investments	31	22
Total investments	5728	5976

Liabilities

Debentures and loans payable	590	585
Customers' advance payments on orders	1089	1379
Other liabilities	1168	1174
Total liabilities	2847	3138

Surplus of assets over liabilities

(including minority interests of 19 million Sfr.,
in previous year 20 million Sfr.)

2881 2838

Source and Application of Funds in the Group

Figures in million Swiss francs

1 US\$ = Sfr. 1.65

1 £ Sterling = Sfr. 3.30

1978

1977



Source of funds

Group profit	45	84
Depreciation on fixed assets	156	167
Cash flow	201	251
Decrease of inventories and work in progress	277	171
Decrease of accounts receivable	—	77
Increase of debentures and loans payable	5	2
Increase of other liabilities	—	24
Variations of exchange rates on net working capital	—	7
Total generation of funds	483	532

Application of funds

Dividend paid for previous year	30	29
Investments in fixed assets	136	113
Increase of financial investments	9	—
Increase of accounts receivable	53	—
Decrease of customers' advance payments on orders	290	172
Decrease of other liabilities	6	—
Variations of exchange rates on net working capital	5	—
Total application of funds	529	314

<i>Change in cash and securities</i>	—46	218
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Explanatory Notes to Group Accounts

Basis for Consolidation and Valuation

All companies which belong commercially to the Group and come under the management and control of the Corporate Executive Management, and whose share capital is owned directly or indirectly to more than 50 per cent by Sulzer Brothers Limited, Winterthur, are included in the Group accounts. The Japanese company Toyoda-Sulzer Manufacturing Ltd., Kyowa, and Talleres Coghlan S.A., Munro (Buenos Aires), together with a few other companies in which we have minority shareholdings, are, on this basis, not included in the Group accounts, nor are they included in the Sulzer Group figures for orders, invoicing and personnel.

The individual valuation of companies in a great number of countries with quite different conditions is necessarily associated with considerable uncertainties.

In the Group accounts, the land items are valued at their original purchase prices. In the case of foreign investments, the rates of exchange valid at the time of acquisition were used to calculate the values.

Buildings, machines and equipment are taken into account at their present-day value, considering adequate age depreciation.

The financial investments represent the estimated values of our interest in unconsolidated companies.

Inventories and work in progress are valued at total cost, but not higher than the current market price.

Claims and liabilities existing between the consolidated companies are counterbalanced against each other.

With the exception of the aforementioned values for land items, the conversion of foreign currencies is based on the rates of exchange valid at the end of the respective year.

Provisions have been made to the extent corresponding to known and existing commitments. Reserves and provisions for possible future costs, which have been set aside in the balance sheets of the individual firms of the Sulzer Group, are included in the surplus of assets over liabilities.

Group Profit and Loss Account

The Group profit and loss account, which is based on the aforementioned guidelines, again shows a decline in the total performance.

Sundry income includes, above all, the income from interest, rents, production of assets for own use, as well as the charging of various services to third parties.

Payments to personnel and social expenditure remained approximately the same as in the previous year, whereas direct material costs and sundry expenditure decreased in line with the decline in total performance.

Cash flow does not take into account investment revaluation. Differences arising from variations of the exchange rates against Swiss francs for fixed assets and net working capital of our foreign companies are likewise not included. On the other hand, losses due to variations in exchange rates connected with the year's business activities have been charged to the financial result for the year.

After deduction of depreciations on fixed assets, the Group profit amounts to 45 million Swiss francs. Due to insufficient utilization of available capacities and depressed selling prices, the majority of our companies obtained considerably less positive results. This applies particularly to Sulzer Brothers Limited, Winterthur, and Compagnie de Construction Mécanique Sulzer, Paris, both of which are showing reduced profits, and Escher Wyss GmbH, Ravensburg, which made a loss.

Survey of the Investments in the Group

The fixed assets are somewhat higher compared to the previous year. Revaluation of the assets in the case of our foreign companies has been largely compensated by the more unfavourable rates of exchange. The increase in financial investments has been brought about by the purchase of an interest in Camsco Inc., Richardson, USA, by an increase in the share capital of the Maschinenfabrik Andritz, Graz, Austria, and by acquiring a participation in the Brazilian foundry of Fundinox Indústria e Comércio de Metais Ltda., São Paulo.

The decrease in inventories and work in progress is attributable to the completion of a number of large-scale contracts. Advance payments from customers are also down for the same reason.

The increase of the surplus of assets over liabilities compared to 1977 includes 70 million Swiss francs for the revaluation of buildings, machinery and equipment, in order to bring them in line with present-day values. Proposed dividend payments totalling 30 million Swiss francs have already been deducted. These payments for dividends are to be made to shareholders of Sulzer Brothers Limited and to third parties having minority interests in Group companies. The changes in currency exchange rates, which occurred during 1978, brought about a decrease in the surplus of assets over liabilities (converted into Swiss francs) of our foreign companies amounting to 42 million Swiss francs. This decrease is the result of a reduction of 37 million Swiss francs in the fixed assets and of 5 million Swiss francs in the case of the net working capital.

Source and Application of Funds in the Group

As against a cash flow of 201 million Swiss francs, dividend payment amounts to 30 million Swiss francs and investment in fixed assets to 136 million Swiss francs.

The decrease in available cash resources, resulting from the decline in customers' advance payments and the increase in accounts receivable, more than counterbalanced the release of financial funds arising from the reduction in inventories and work in progress.

Hence, there is a slight decrease of securities and available cash resources.

Around the Divisions

Winterthur Engineering Works

Diesel Engines and Marine Equipment

The situation in the shipbuilding industry has become even more critical, but towards the end of 1978 a rise in freight rates indicated a possible change of trend.

Falling sales and the ruthless price war made it necessary to slow down production in the factories of the parent company. A number of orders for medium-speed Z40/48 engines made a significant contribution to satisfactory utilization of production facilities at the Mantes works of Compagnie de Construction Mécanique Sulzer in France, which specializes in these engines. Our licensees achieved considerable success with large slow-speed engines of type RND 90 M for high performance, fast container ships.

In spite of shrinking business in shipbuilding, the parent company and its licensees received orders for Sulzer diesel engines for a total output of 2 500 000 kW (3 400 000 bhp), compared with 2 600 000 kW (3 500 000 bhp) the previous year, thus enabling Sulzer marine diesel engines to retain their leading position on the world market.

In the year under report, Sulzer diesel engines with a total output of 3 000 000 kW (4 100 000 bhp)—previous year 3 200 000 kW (4 300 000 bhp)—were installed in new ocean-going ships of more than 2000 t deadweight. In the slow-speed engine sector, we achieved a market share of over 52 %, the same as in the preceding year; whereas our share of the medium-speed engine market

increased from 4 % (1977) to 7.5 % (1978). Medium-speed engines made up a much higher proportion of the world production of marine diesel engines, so that our total share of the market amounted overall to 36 % (previous year 41 %).

The excellent operating performance displayed by the RND-M engine was instrumental in achieving the success of the slow-running engines. Further perfection of this product line led to another reduction in fuel consumption. The first engines of the new RLA range with lower speeds (type RLA 56) have shown good operating results. Manufacture of the first RLA 90 engine is well advanced. In the medium-power range of this product line, an RLA 66 engine has been introduced as a new feature.

In the field of medium-speed engines, emphasis was laid on improving ability to burn heavy fuel oil. Separate cylinder lubrication and the use of rotating pistons have made it possible to run the Z40/48 engine economically on relatively poor-quality fuels. As a whole, the market prospects for this engine are regarded as favourable.

In collaboration with our licensees, we increased sales of the successful AS 25/30 engine in the inland waterway shipping sector and for fishing and other special vessels. Also for this engine, research work concentrates on better combustion of heavy fuel oil.

Project activity in *stationary engines* was very lively, but protracted negotiations resulted in sales targets not being fully attained.





Transport of a spiral casing for one of the four 92-MW storage pumps made by Escher Wyss for the Grimsel II hydraulic power station in the Bernese Oberland, Switzerland.

Generation of energy



Expansion zone of a Sulzer Helix steam generator for the 300-MWe THTR nuclear power station at Schmehausen, Federal Republic of Germany.



Sulzer steel casting: bifurcation for a 1200-MW steam turbine installation (weight of casting 9800 kg).

◁ New thermal power station unit (335 MW) at Sostanj, Yugoslavia, with a lignite-fired Sulzer Monotube steam generator.

◁ Largest diesel power station in the world at Bong Range, Liberia. The total output was raised to 100000 kW in 1978 by increasing the number of Sulzer diesel engines to 11.

Residential and public buildings

Sulzer water-treatment plant at Vengeron,
Geneva, producing drinking water
(photo shows the machine room with
Sulzer pumps).



Sulzer has already supplied refrigerating
plants for ice-skating rinks of combined
area totalling more than 1 000 000 m².



Part of the Sulzer plant at Grenzach
(Federal Republic of Germany) treating
water from the River Rhine for the
chemical industry.



Sulzer dual-duct air conditioning plant
in the Cantonal Hospital, Schaffhausen.



Aubrigg district heating power station, Zurich—first constructional phase:
Sulzer was responsible for the engineering, installed the distribution system
and supplied two natural circulation boilers.

Thermal Plants and Nuclear Engineering

Fewer orders were placed worldwide for *boiler installations* in 1978, though conditions varied widely from country to country. Competition was fierce everywhere. Shortly before the end of the year, we commissioned a large boiler supplied to the People's Republic of China for a thermal power station. Important orders were booked by our licensees in Japan and France.

In the *control systems and valves* sector, there was a lively demand for such equipment in both fossil-fuel and nuclear power stations. Orders received almost reached the high level of the preceding year.

In the field of *combined cycle plants*, interest was increasingly concentrated on energy-saving heat/power packages utilizing steam plant and gas turbine power units.

The high level of orders for *reactor components* provided full employment for the technical offices. We were successful in obtaining some additional orders for high-density storage racks for spent fuel elements in nuclear power stations. Delays in the construction of nuclear power stations, however, left certain sectors of the workshops only partly occupied.

Refrigeration Plants, Compressors and Process Engineering

In the field of *refrigeration engineering*, orders received surpassed expectations. The parent company increasingly dealt with projects for turn-key plants, especially for the Middle East, and this brought in some substantial orders. At the end of 1978, we also successfully commissioned a concrete cooling installation for the dam of the gigantic ITaipu hydroelectric complex on the frontier be-

tween Brazil and Paraguay. We were able to maintain our position on the turbo water chiller market, in spite of the unsatisfactory currency exchange situation.

In Switzerland, the combination of weak demand and an excessively high Swiss franc exchange rate inhibited business in *compressors*. Order volume receded and margins had to be reduced. In Brazil, we were able to increase sales of machines produced in our Rio de Janeiro works.

In the process engineering field, sales of *rectification columns* and *heavy-water separation plants* dropped. Newly developed types attracted special interest. We delivered our first plant for the extraction of boron isotopes and received first orders for large-scale gas mixers. Demand for static mixing units continued to increase.

In the *cryogenics* field, our activities proceeded satisfactorily. Orders booked for helium refrigeration installations and components were higher than in the preceding year, and we were able to gain a foothold in new markets, mainly in Italy and Romania. Successful commissioning of several plants consolidated our leading position in this field.

The Burckhardt Engineering Works Ltd., Basle

In the *hypercompressor* sector, orders received fell appreciably, due to worldwide excess capacity for low-density polyethylene and to the cautious attitude of the customers.

In the field of small and series-manufactured *compressors*, the planned targets were slightly exceeded. Business in medium-sized compressors showed a noticeable improvement over the preceding year.

Sales of *vacuum pumps* were maintained at the 1977 level.





Research aimed at providing improved working conditions in a weaving mill. Measurement of the noise level distribution around a Sulzer weaving machine.

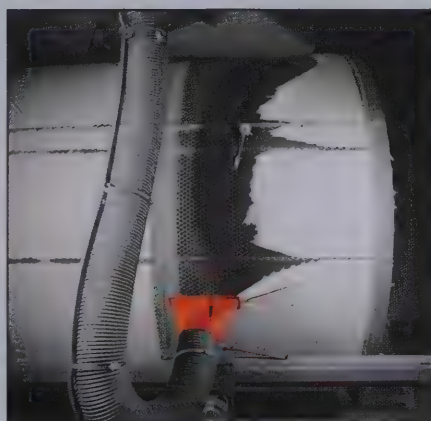
Textile industry



Shed with 312 Sulzer weaving machines in a Turkish mill processing cotton and man-made yarns.



◁ Terry fabrics from the range produced by a Brazilian textile mill using Sulzer weaving machines.



Sulzer drum filter for extract air cleaning in textile mills.

◁ Knitting machines from Sulzer Morat can produce a wide range of knitted fabrics.

Pulp and paper industry

NIPCO®-PRINT roll, a speciality of Escher Wyss, installed in a rotogravure press.



Escher Wyss fine-paper machine supplied to Henspapier, Eerbeek, Holland. Press, MG cylinder and calender sections incorporate zone-controlled NIPCO® rolls.



Double-disc refiners in an Escher Wyss stock preparation plant.

2 779 0004

Textile Machinery

The textile industry was among those that were seriously affected by the generally adverse world economic conditions during the year under report. Although satisfactory production conditions prevailed in a few countries, the volume of investment in the textile industry worldwide remained below the figures for the recent years.

In the *weaving machines* sector, orders received failed to reach the level of 1977. The below-average order volume from the United States was compensated to a certain extent by improved market shares in the Federal Republic of Germany, Italy, Great Britain and Greece.

Both the general uncertainty about economic trends and the fierce competition for every important project affected selling prices. Thanks to the outstanding quality of our products and to the extensive service we offer, our weaving machines were again very well received by customers. Generally speaking, our market position was maintained, while in some sub-sectors it was further improved.

Our highly sophisticated production control system makes it possible for us to comply with customers' wishes to an unusually large extent and to handle orders for rather short delivery. In Japan, the market situation improved noticeably, and this enabled Toyoda-Sulzer to sell a larger proportion of its production on the domestic market.

Development work was pushed ahead intensively in preparation for the ITMA, the most important international exhibition of the textile machinery industry, which will be held at Hanover in October 1979.

The restructuring measures which were decided in 1977 for *circular knitting machines* proved to be justified. The total value of orders received by Sulzer Morat GmbH, Filderstadt, continued to be low, but was satisfactory in view of the difficult market situation. In the Sulzer Morat pile fabric knitting machine sector, the sales results were good, particularly with regard to its application for artificial furs.

Heating and Air Conditioning

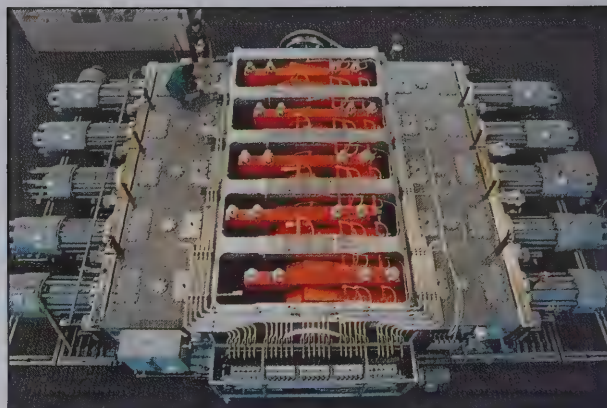
Within Switzerland, business in heating, air conditioning, sanitary and electrical installations and fire-protection equipment varied considerably from one branch and company to another. Generally speaking, a satisfactory volume of orders could be obtained, which corresponds to that of the preceding year. But there was a clear shift from public and industrial construction towards residential building, as well as to installations and equipment for saving or recovering energy.

The companies outside of Switzerland reached varying levels of success, though the overall picture can be described as satisfactory. Gebrüder Sulzer Heizungs- und Klimatechnik GmbH, Stuttgart, achieved a good volume of sales, both within and outside of the Federal Republic of Germany. Nederlandsche Caliqua B.V., Tilburg, also obtained a useful inflow of orders. Activity in France suffered from the unfavourable market conditions. A very satisfactory order intake was achieved by Gebrüder Sulzer Gesellschaft mbH, Vienna. Existing capacity was only partially utilized in Great Britain. Interest was restrained in Spain. The Argentinian company was able to counterbalance the absence of orders for textile plant air conditioning mainly by an increased activity in comfort air conditioning. In Brazil, orders from the textile sector still form a significant part of the incoming business.

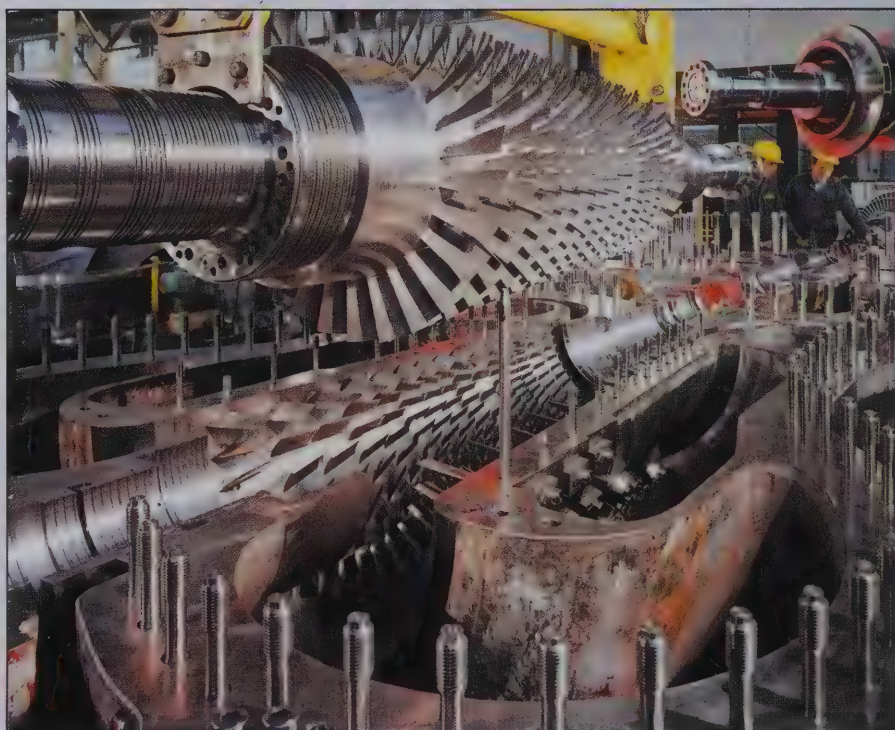
Chemical industry

Burckhardt hypercompressor (rating 17 000 kW) for the compression of 120 000 kg ethylene gas per hour to 2200 bar.

Sulzer rectification column (length 44 m) for the separation of chemical products.



Model of a caustic soda evaporation and sodium sulphate extraction plant supplied by Escher Wyss to the VEB Chemiekombinat, Bitterfeld, German Democratic Republic.



Triple-casing Sulzer turbocompressor set for a nitric acid production plant.

2175/005

Pumps

Inflow of orders varied markedly between the individual companies forming the Pump Division. Sulzer Weise GmbH, Bruchsal, was able to maintain its position on the highly competitive German home market, but exported noticeably less. On the other hand, our French company was able to improve its export performance still further. The companies in Great Britain and the Netherlands retained their positions, particularly on the respective home markets. In South Africa, two big orders for pumps to be supplied to thermal power stations led to a remarkable rise in business, whereas in Brazil the Government's restrictive economic policy inhibited sales for Sulzer Weise S.A. Business in Mexico and Venezuela was good. Turnover in Switzerland was increased by comparison with 1977.

Thermal Turbomachinery

Business in the *gas turbine* field was considerably impaired by extremely strong competition worldwide. The high Swiss franc exchange rate and political difficulties in important customer countries additionally inhibited sales. For these reasons, orders received were below expectations.

As a consequence of the continuing worldwide recession, incoming orders in the *turbocompressor* field also suffered a decline.

In spite of the difficult situation in the paper industry, sales of *Turbair blowers* developed satisfactorily. Our licensee in the United States was especially successful with sales of the new Turbair vacuum blowers.

Foundries

As a whole, orders received were below last year's figures. In the fields of grey and precision castings demand was larger than in 1977, but interest for spheroidal graphite iron, steel and non-ferrous castings was recessive.

Industrial Electronics, Water and Waste-Water Treatment

Orders received in the *water and waste-water treatment* sector were higher than last year. On the Swiss market, customers remained cautious, but we were successful in obtaining a large order for a drinking-water supply system from abroad. Our company in the Federal Republic of Germany received orders for the supply of plant from several water utilities. In France, sales remained below expectations.

The rapid, unceasing development of technology in industrial electronics, and particularly in the field of microprocessors, has opened up a variety of solutions to problems for the control, regulation and data-processing of machinery and plants. The activity of the *industrial electronics* section was concentrated on combining electronics with other Group products. In addition to the delivery of well-tried equipment and systems, it also initiated a number of promising development projects.

Plant Engineering and Contracting

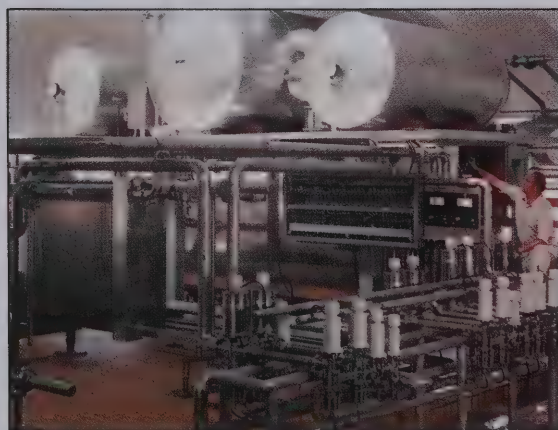
No large orders for the engineering of *complete plants* were received in 1978. However, from incoming enquiries some promising projects could be added to those already being actively pursued on a long-term basis. In November 1978, the Pulp and Paper Mill Basrah II, Iraq, was accepted provisionally by the customer. Erection is nearing completion of another pulp and paper mill at Misan, Iraq, and commissioning is to be started in May 1979. Two heavy-water installations at Baroda and Tuticorin, India, were handed over to the customer.

Foodstuffs processing

Escher Wyss scraper centrifuge with valve assembly panel and electrical control cubicle.



Cold store by the quayside at Kuwait—cooled by a Sulzer refrigerating plant (total cold store volume 30 100 m³).



Sulzer wort cooling plant at the Feldschlösschen brewery, Rheinfelden, Switzerland.

Combined thermocompression—quintuple-effect evaporation plant supplied by Escher Wyss to a salt works at Varangéville, France.



Medical Engineering

In spite of sharper competition, order bookings were increased significantly by comparison with the preceding year. The basis of the sales range is a wide selection of hip-joint prostheses, and this has been supplemented by additional artificial joints newly launched on the market, such as knee joints. The stringent quality requirements applying for medical engineering products could be fully met.

Sales Organization

In Australia, the existing branch of Sulzer Bros (UK) Ltd., Farnborough, Hampshire, has been converted into a subsidiary company of Sulzer Brothers Limited, Winterthur, and named Sulzer Australia Pty. Limited, North Sydney.

Corporate Research and Development

Intensified competition and increased technical requirements led to heavier claims by the product groups on the services of the Central Research and Development Department. Its main activities were again concentrated on complex questions related to the selection of material as well as to the combined dynamic, thermal, corrosive and tribological requirements. Improved measuring techniques and computer programs made it possible to refine analyses and predictions for such phenomena as stress behaviour in components, multi-dimensional fluid flows and coupled oscillations.

Escher Wyss Zurich

Demand in the *hydraulic machinery and plant* sector was very lively. Order intake was satisfactory on the whole, though below the extraordinarily high figure of the preceding year. Special mention may be made of an order from Nigeria for six propeller-type turbines with 7.1 m diameter runners, another from Pakistan for the world's largest penstocks with an 11 m intake diameter, one from Spain for three 3-stage pump-turbines and one from Guatemala for five vertical 6-nozzle Pelton turbines plus accessories.

In the STRAFLO turbine sector (turbines with rim generators), another important order was received from Austria at the end of 1978, for two double-regulated machines with a runner diameter of 3.7 m.

In *process engineering machinery and plant*, order flow developed differently in the individual sub-sectors, but was below the preceding year's total figure. In the plant construction sector, the number of orders was below expectation. Execution of numerous projects was repeatedly postponed. New orders were obtained in the salt refinery, pulp and starch fields. Order intake in the centrifuge sub-sector was maintained at almost the 1977 level. Noteworthy sales of centrifugal decanters were reported. High-performance pusher centrifuges also sold well. Drum dryers—including cooling drums and installations for the food and feeding stuffs industries—did not reach the expected level of orders.

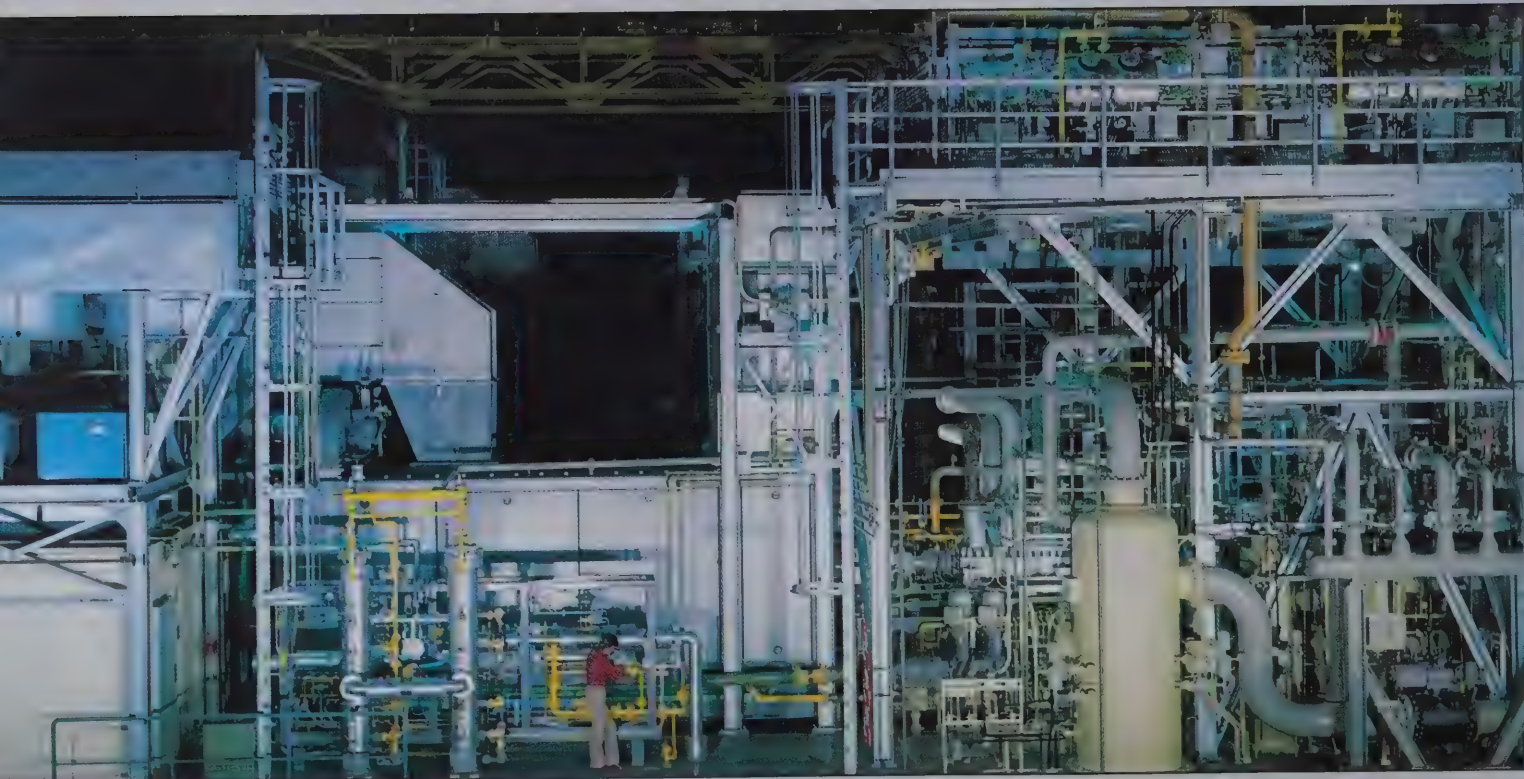
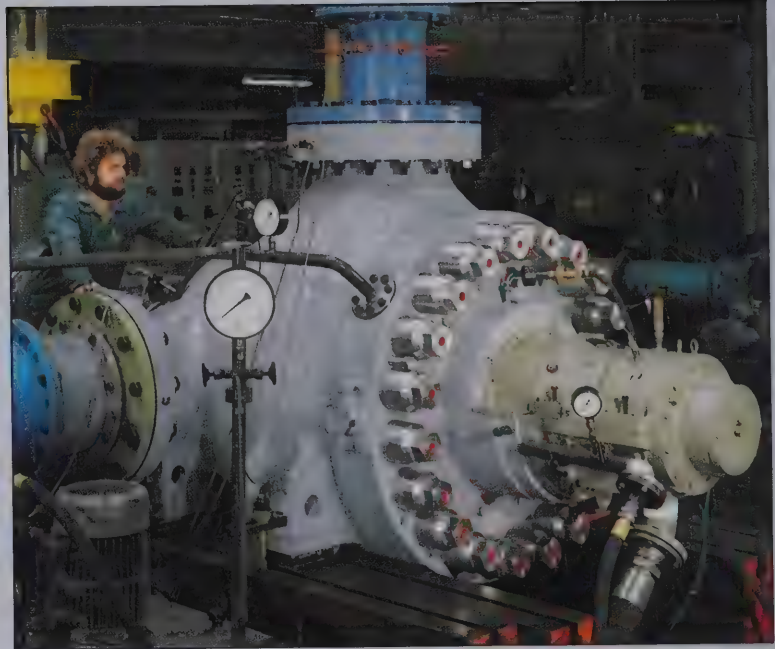
In the roll technology field, orders for NIPCO rolls with highly flexible sleeves for multicolour rotogravure showed an increasing trend. Research and development work on additional applications of the NIPCO system is proceeding according to plan.

Crude oil and natural gas exploitation

Sulzer spherical pressure
vessels for the storage of
hydrocarbon gases (effective
volume 3000 m³ each).



Sulzer injection pump, rating 15 000 kW,
for an oil-field in Saudi Arabia.



Sulzer gas turbine—turbocompressor modules,
used for gas-lift, on a platform in the Gulf of Suez.



Controllable-pitch marine propeller from Escher Wyss, rating 8560 kW (11 650 bhp).

"Thames Maru"—a container ship powered by two Sulzer 12 RND 90 M diesel engines of combined output, 61 800 kW (84 000 bhp). ▽

Transport



Sulzer bridge control desk for a roll-on/roll-off ship with medium-speed engines.

Unloading of a rack railcar for the Corcovado mountain railway, Rio de Janeiro, built by the Swiss Locomotive and Machine Works, Winterthur.

The *Bell Engineering Works Ltd., Kriens*, received more orders than in the preceding year. Thanks to attractive financing conditions, the hydraulic section obtained some further important contracts for Pelton and Francis turbines from Ecuador. A large Swiss reconstruction project led to an order for a bulb turbine installation. The *asbestos-cement machinery* section was successful in selling four complete sheet plants. The company's good international reputation in the specialized field of board installations led to orders for one asbestos board plant and one asbestos paper plant from Yugoslavia. The new *plastics processing machinery* section was able to deliver its first high-output blow moulding plant for plastic containers.

Escher Wyss Ravensburg

In spite of little interest for investment in the paper industry, more orders for *paper and board machinery and plant* as compared with the previous year were obtained, and our market position was further improved. A contract from the USSR for the supply of equipment for four plants to produce daily 1400 t of folding boxboard from waste paper is noteworthy. In addition, rebuild orders for a paper and a board machine were placed in the Federal Republic of Germany, while two paper machine rebuilds were ordered from the USA. A number of contracts were also obtained for the supply of stock preparation plant.

In the *controllable-pitch propeller* sector, Escher Wyss Ravensburg booked orders for eight such units, while De Pretto—Escher Wyss, Schio, are to supply eleven controllable-pitch propellers and three transverse thrusters. Two propellers, each rated at 7350 kW (10000 bhp), for freighters, and one at 14700 kW (20000 bhp), for a refrigerator ship, are worthy of special mention. Cooperation with licensees was successful and led to orders for 36 controllable-pitch propellers of a total rating of 206000 kW (280000 bhp).

Swiss Locomotive and Machine Works, Winterthur

In 1978, order intake was again below deliveries. As a result, total work in hand decreased further and the employment situation became even more uncertain. The main cause is the reduction in orders for main-line locomotives from the Swiss Federal Railways.

Thanks to the federal assistance credit for private railway companies, two new orders for motor bogies were received, one from the Lucerne—Stans—Engelberg Railway for a rack railcar, and one from the St. Gall—Gais—Appenzell Railway for six rack railcars. In addition, two rack railway diesel locomotives will be delivered to an Italian customer.

The gear department received a further order for propulsion and steering transmissions for Swiss army tanks and it supplied installations for mountain railways.

Deliveries worthy of mention included six-axle main-line locomotives and additional diesel-electric shunting units for the Swiss Federal Railways. An electric rack railcar was successfully commissioned for the Zugspitze Railway, Bavaria, and another for the Société lyonnaise de transports en commun, Lyon.

The SULZER Group

<i>Switzerland</i>	Sulzer Brothers Limited, Winterthur Swiss Locomotive and Machine Works, Winterthur Escher Wyss Limited, Zurich Bell Engineering Works Ltd., Kriens, Lucerne The Burckhardt Engineering Works Ltd., Basle ELMA Electronic Ltd., Wetzikon
<i>Federal Republic of Germany</i>	Gebrüder Sulzer Holding GmbH, Filderstadt Sulzer Morat GmbH, Filderstadt Escher Wyss GmbH, Ravensburg Sulzer-Escher Wyss GmbH, Lindau Sulzer Weise GmbH, Bruchsal Gebrüder Sulzer Heizungs- und Klimatechnik GmbH, Stuttgart Gebrüder Sulzer GmbH, Hamburg
<i>France</i>	Compagnie de Construction Mécanique Sulzer, Paris Chauffage et Climatisation Sulzer S.A., Paris Escher Wyss (France) S.A., Paris
<i>Great Britain</i>	Sulzer Bros (UK) Ltd., Farnborough (Hampshire)/Leeds
<i>Italy</i>	De Pretto-Escher Wyss S.p.A., Schio (Vicenza)/Milano
<i>Belgium</i>	S.A. Sulzer Belgium N.V., Bruxelles
<i>Netherlands</i>	Sulzer Nederland B.V., Amsterdam Nederlandsche Caliqua B.V., Tilburg Sulzer Delta B.V., Hengelo
<i>Norway</i>	Sulzer Brothers Norge A/S, Oslo
<i>Austria</i>	Gebrüder Sulzer Gesellschaft mbH, Heizungs- und Klimatechnik, Vienna Gebrüder Sulzer, Escher Wyss, Kältetechnik Gesellschaft m.b.H., Lauterach
<i>Portugal</i>	Sulzer Irmãos Lda, Lisboa/Porto
<i>Spain</i>	Sulzer España S.A., Madrid/Barcelona
<i>USA</i>	Sulzer Bros. Inc., New York/San Francisco/Houston Textile Machinery Division, Spartanburg
<i>Canada</i>	Sulzer Bros. (Canada) Ltd., Pointe-Claire (Montreal)/Toronto/Vancouver/Calgary
<i>Mexico</i>	Sulzer Hermanos S.A., México
<i>Argentina</i>	Sulzer Hermanos S.A.C.I., Buenos Aires
<i>Brazil</i>	Sulzer do Brasil S.A., Rio de Janeiro/São Paulo Sulzer Weise S.A., São Paulo
<i>Peru</i>	Sulzer del Perú S.A., Lima
<i>Japan</i>	Sulzer Brothers (Japan) Ltd., Tokyo/Kobe Textile Machinery Division, Ibaraki, Osaka Toyoda-Sulzer Sales Ltd., Ibaraki, Osaka Toyoda-Sulzer Manufacturing Ltd., Kyowa
<i>South Africa</i>	Sulzer Bros. (South Africa) Ltd., Johannesburg/Durban/Capetown
<i>Algeria</i>	Sulzer Bureau de Liaison Alger, Alger
<i>Middle East</i>	Sulzer Brothers/Escher Wyss, Middle East Consulting Office, Beirut (Lebanon)
<i>Iran</i>	Sulzer Iran (Private Joint-Stock Company), Tehran
<i>S.E. Asia</i>	Sulzer East Asia Central Office, Singapore
<i>Australia</i>	Sulzer Australia Pty. Limited, North Sydney/Melbourne

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